

FORM PTO-1590 (REV. 9-2001)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	
<b>TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371</b>		ATTORNEY'S DOCKET NUMBER <div style="text-align: center;">5/1263</div>	
INTERNATIONAL APPLICATION NO. <div style="text-align: center;">PCT/EP00/05801</div>		INTERNATIONAL FILING DATE <div style="text-align: center;">23 June 2000</div>	
TITLE OF INVENTION <b>METHOD AND DEVICE FOR PRODUCING PELLETS</b>		U.S. APPLICATION NO. (If known, see 37 CFR 1.5 <div style="font-size: 1.5em; font-weight: bold;">10/018641</div> to be assigned	
PRIORITY DATE CLAIMED <div style="text-align: center;">28 June 1999</div>			
APPLICANT(S) FOR DO/EO/US <b>Wolfgang Joerg; Johann Schwartz; Andreas Ege; Robert Becker and Gerhard Steiner</b>			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</li> <li>4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</li> <li>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))           <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</li> <li>b. <input checked="" type="checkbox"/> has been communicated by the International Bureau.</li> <li>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</li> </ol> </li> <li>6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).           <ol style="list-style-type: none"> <li>a. <input checked="" type="checkbox"/> is attached hereto.</li> <li>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</li> </ol> </li> <li>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))           <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</li> <li>b. <input type="checkbox"/> have been communicated by the International Bureau.</li> <li>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</li> <li>d. <input checked="" type="checkbox"/> have not been made and will not be made.</li> </ol> </li> <li>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).</li> <li>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</li> <li>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</li> </ol>			
<b>Items 11 to 20 below concern document(s) or information included:</b>			
<ol style="list-style-type: none"> <li>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</li> <li>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</li> <li>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment.</li> <li>14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</li> <li>15. <input type="checkbox"/> A substitute specification.</li> <li>16. <input type="checkbox"/> A change of power of attorney and/or address letter.</li> <li>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.</li> <li>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</li> <li>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</li> <li>20. <input checked="" type="checkbox"/> Other items or information:            Initial Information Data Sheet;            Form 1449A/PTO;            Copies of References as cited on Form 1449A/PTO; and            Copy of Priority Document Number 199 29 526.3         </li> </ol>			

U.S. APPLICATION NO. (if known, see 37 CFR 1.51) <b>to be assigned 10/018641</b>		INTERNATIONAL APPLICATION NO. <b>PCT/EP00/05801</b>		ATTORNEY'S DOCKET NUMBER <b>5/1263</b>	
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21. ☐ The following fees are submitted:

**BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):**

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. .... **\$1040.00**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... **\$890.00**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... **\$740.00**

International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... **\$710.00**

International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) ..... **\$100.00**

**ENTER APPROPRIATE BASIC FEE AMOUNT =**

Surcharge of **\$130.00** for furnishing the oath or declaration later than ☐ 20 ☒ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	15 - 20 =	0	x \$18.00	\$	0.00
Independent claims	2 - 3 =	0	x \$84.00	\$	0.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)				+	\$280.00
<b>TOTAL OF ABOVE CALCULATIONS</b>				=	\$ 1,020.00
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				+	
<b>SUBTOTAL</b>				=	\$ 1,020.00
Processing fee of <b>\$130.00</b> for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).					
<b>TOTAL NATIONAL FEE</b>				=	\$
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +					
<b>TOTAL FEES ENCLOSED</b>				=	\$ 1,020.00
				Amount to be refunded:	\$
				charged:	\$

**CALCULATIONS PTO USE ONLY**

a. ☐ A check in the amount of \$ \_\_\_\_\_ to cover the above fees is enclosed.

b. ☒ Please charge my Deposit Account No. 02-2955 in the amount of \$ 1,020.00 to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-2955. A duplicate copy of this sheet is enclosed.

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**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

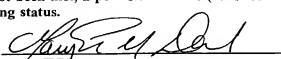
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 Mary-ellen M. Devlin  
 NAME  
 27,928  
 REGISTRATION NUMBER

JC13 Rec'd PCT/10 19 DEC 2001

#4/a

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of : Wolfgang Joerg et al ) Docket No.: 5/1263  
 Serial No. : to be assigned ) Art Unit:  
 Confirmation No.: to be assigned ) Examiner:  
 I.A. Filing Date : June 23, 2000 )  
 Submitted : December 19, 2001 )  
 For : Method and Device for Producing Pellets

Box PCT  
 Assistant Commissioner for Patents  
 Washington, D.C. 20231

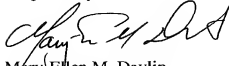
PRELIMINARY AMENDMENT

Sir:

Please cancel Claims 1 through 14.

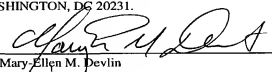
Please add the following new claims, 15 through 29 as shown on the enclosed pages.

Respectfully submitted,



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 Attorney for Applicant(s)  
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 Docket No. 5/1263

"EXPRESS MAIL" LABEL NO.: EL 681 164 618 US DEPOSIT DATE: December 19, 2001	
I HEREBY CERTIFY THAT THIS PAPER OR FEE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE "EXPRESS MAIL POST OFFICE TO ADDRESSEE" SERVICE UNDER 37 CFR 1.10 ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE BOX PCT ASSISTANT COMMISSIONER FOR PATENTS, WASHINGTON, DC 20231.	
By:	 Mary Ellen M. Devlin Reg. No. 27,928

Newly Added Claims 15 through 29

15. A Process for producing pellets (4) from a viscous medium (2), wherein the medium (2) to be processed is fed continuously to a metering device (11, 61) which is operated under cyclical control, by means of which the medium (2) is divided into individual fragments (3) of a pre-selected length and these fragments are expelled or ejected over a pre-selected distance (S).
16. The process as recited in Claim 15 wherein the medium is fed continuously under constant pressure.
17. The process according to claim 15, wherein the temperature of the medium (2) to be processed is adjusted, before it is fed to the metering device (11, 61), by heating or cooling a storage container (5, 54) or a delivery line (6) or the metering device (11, 61), or a combination of one or more of the foregoing.
18. The process according to claim 15, wherein the temperature of the expelled fragments (3) is controlled during the ejection over the entire area or in one or more parts of the distance (S).

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19. The process according to claim 15, wherein the individual fragments (3) are expelled at an accelerated speed, e.g. with the aid of a discharge device (21).
20. The process according to claim 15, wherein the fragments (3) are provided with a coating during the ejection.
21. The process according to claim 15, wherein the fragments (3) are expelled in a ballistic trajectory.
22. An apparatus (1, 61) for producing pellets (4) from a viscous medium (2), which comprises a metering device (11, 61) operated under cyclical control, to which the medium (2) to be processed is supplied continuously under pressure and by means of which the medium (2) is divided into individual fragments (3) of a pre-selected length which are preferably expelled at an accelerated rate over a pre-selected travel distance (S).
23. The apparatus according to claim 22, wherein the metering device (11) is constructed as a shutoff valve (12) which can be operated cyclically by magnetic, hydraulic, pneumatic, piezoelectric or mechanical means.

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24. The apparatus according to claim 23, wherein the valve member of the shutoff valve (12) may be constructed as a sphere (14) or cone (15) co-operating with a spherically shaped valve surface (16) or as a slide member (17) which can be pushed into the delivery line (6) and is provided with a tip (18) which is triangular in cross section.
25. The apparatus according to claim 22, wherein the metering device (11) may be constructed as a fluidic valve constructed in the form of a section of hose (19) attached to the delivery line (6) and provided with a piezo-actuated drive element.
26. The apparatus according to claim 22, wherein the metering device (61) is formed as a valve tappet (62) displaceably inserted in a housing (52) and operated cyclically by magnetic, hydraulic, pneumatic, piezoelectric or mechanical means, which has a spherically or conically shaped tip (63) and co-operates with a collecting chamber (65) to which the medium (2) may be fed from a storage container (54) preferably integrated in the housing (52).
27. The apparatus according to claim 26, wherein valve tappet (62) has associated therewith a conically shaped

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chamber (57) adapted to fit the tip (63) thereof,  
having an outlet port (958) adjoining the latter.

28. The apparatus according to claim 22, wherein a discharge device (21) is provided downstream of the metering device (11).
29. The apparatus according to claim 28, wherein adjoining the discharge device (21) is an oscillator (40) in which a vibration of 20 Hz to 20 kHz is produced by means of a generator (41).

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10/018641  
JC13 Rec'd PCT/PTO 19 DEC 2001Method and Device for Producing Pellets

The invention relates to a process for producing pellets from a viscous medium and an apparatus for carrying out this process.

In drug therapy, pellets are frequently used as carriers for pharmaceutical substances; they are prepared by various methods, some of which are very laborious. According to one of these methods, the so-called spray hardening method, a liquid medium enriched with the pharmaceutical substances is continuously forced through a spray nozzle. On leaving the spray nozzle, the jet of liquid is broken up into particles of different sizes which harden as they fall.

Uniform pellets, i.e. those of identical size, which have reproducible and predictable release characteristics, cannot be produced by this method, however, but instead the particles obtained in a broad spectrum of sizes have to be sorted by screening in a subsequent operation. Apart from the fact that sometimes a large proportion of the medium being processed has to be rejected, in order to produce pellets of other sizes it is necessary to change the nozzle and subsequently grade the pellets. The work involved in manufacture, even with this simple spray hardening process, is therefore considerable.



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The aim of the invention is therefore to provide a process for producing pellets from a viscous medium and an apparatus for carrying out this process which make it possible always to produce uniform pellets of virtually the same size and reproducibility, which will therefore have the same release characteristics, in a single operation. Moreover, it should be possible to vary the size of the pellets by simple means and to process media of differing viscosity. The labour involved in achieving this should be kept to a minimum but at the same time the pellets should be capable of being produced cheaply within a short space of time.

According to the invention, the process by which this is to be achieved is characterised in that the medium which is to be processed is supplied continuously, under preferably constant pressure, to a metering device which can be operated cyclically, by means of which the medium is divided into individual fragments of a given length and these are ejected over a pre-selected distance.

It is useful to adjust the temperature of the medium being processed before it is fed into the metering device by heating or cooling a storage container and/or a delivery line and/or the metering device and to adjust the temperature of the ejected fragments during the ejection over the entire area or in one or more sections of a distance by means of the ambient temperature.

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The individual fragments can also be ejected at high speed by means of a discharge device, in which the fragments are expelled in a ballistic trajectory and can be provided with a coating during the ejection.

The apparatus for carrying out this process is characterised by a metering device which can be operated cyclically, to which the medium to be processed can be supplied continuously under pressure and by means of which the medium can be divided up into individual fragments of a given size which can preferably be ejected at high speed and over a pre-selected distance.

The metering device may be constructed as a shutoff valve which is operated cyclically by magnetic, hydraulic, pneumatic, piezoelectronic or mechanical means, while the valve member of the shutoff valve may be constructed as a sphere or cone co-operating with a spherically shaped valve surface or as a slide which can be pushed into the delivery line, provided with a tip which is triangular in cross section.

However, the metering device may also be constructed as a fluidic valve constructed in the form of a section of hose attached to the delivery line and provided with a piezo-actuated drive element.

According to another embodiment, the metering device may also be constructed as a valve tappet which is displaceably inserted in a housing and is cyclically operated by magnetic, hydraulic, pneumatic, piezo-electronic

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or mechanical means, which has a conical or spherical tip and co-operates with a collecting chamber to which the medium can be fed from a storage container preferably integrated in the housing.

It is appropriate to associate with the valve tappet a conically shaped chamber adapted to fit its tip and to incorporate the chamber as well as an outlet port adjoining said chamber in a cover which is releasably connected to the housing.

In order to ensure a uniform supply of the medium which is to be processed, the collecting chamber is to be formed by two or more supply channels extending radially to the chamber associated with the valve tappet, preferably incorporated in the cover, these channels being connected to the storage container directly via an annular space or via connecting channels.

Moreover, the storage container and/or the housing should be fitted with heating cartridges in the region of the collecting chamber and in order to drive the valve tappet a piston should be provided which is mounted in a guide bushing replaceably inserted in the housing.

It is also advantageous to provide, downstream of the metering device, a discharge device which can be supplied with a carrier medium, e.g. compressed air, to accelerate the fragments which are to be expelled.

Experience has shown that there is a possibility of the discharge device becoming blocked. To counter the risk of

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blockage, an oscillator may advantageously be included in the apparatus. This oscillator is directly connected to the discharge device and generates a vibration of 20 Hz to 20 kHz, depending on the type of fouling which is transferred to the discharge device. This vibration is produced in the oscillator by means of a generator. As a result of this oscillating effect, no medium for processing is left on the opening and the product drips off cleanly.

The outlet port of the metering device or of the discharge device should be inclined upward at an angle  $\nabla$  of 25 to 35° to the horizontal, in order to achieve a ballistic trajectory.

It is also advisable to provide, downstream of the metering device or the discharge device, a tunnel equipped with cooling elements and/or having a gas atmosphere, which is supposed to have an operating pressure below or above atmospheric pressure and which may be fitted with one or more spray nozzles for coating the fragments or pellets. In addition, a catching container may be provided downstream of the metering device or the discharge device.

Moreover, the medium which is to be processed should be enclosed in a heatable or coolable storage container. The metering device, preferably together with the drive members and optionally the discharge device, may be arranged together in one housing.

Using the process according to the invention or the apparatus for carrying out this process, it is extremely

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easy and cheap to produce pellets of virtually identical size and hence with constant reproducibility, as carriers of pharmaceutical substances, from a viscous medium and to change their size without any difficulty, if required. Using the metering device, in fact, the medium which is continuously supplied under pressure can be divided into individual fragments the length of which can be adjusted to suit the intended use, and these fragments can be ejected at high speed so that the fragments are shaped into pellets during their flight as a result of the surface tension present, these pellets taking on the same shape as one another, since the fragments supplied have the same shape and the conditions of ejection of the fragments are also the same. There is therefore no need to grade them; nor is there any reject material.

Since all the pellets produced in one step of the process therefore have virtually the same shape and surface, the release characteristics of the particular group of pellets will be reproducibly uniform and predictable. Moreover, during manufacture, the size of the pellets produced can readily be controlled using the metering apparatus, since the metering apparatus can easily be made to open and close cyclically and individual sizes of pellet can readily be produced by varying the opening and closing times. Thus, by connecting a plurality of control mechanisms with correspondingly high cycle rates in parallel, pharmaceutical formulations can be produced

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extremely economically by manufacturing pellets with a homogeneous particle profile.

The drawings show two embodiments of an apparatus constructed according to the invention for producing pellets from a viscous medium, which will be described more fully hereinafter. In the drawings, which are diagrammatic:

Figure 1 shows a block circuit diagram of an apparatus provided with a metering device,

Figure 2 shows the apparatus of Figure 1 with a discharge device connected downstream,

Figure 3 shows the apparatus of Figure 1 in a modified embodiment,

Figure 4 shows the metering device of the apparatus according to Figure 3 on a larger scale,

Figures 5 and 6 show different embodiments of the metering device which may be used in the apparatus of Figure 1,

Figure 7 shows a tunnel which may be used in the apparatus of Figure 1,

Figure 8 shows a different embodiment of an apparatus for producing pellets, in axial section,

Figure 9 shows the apparatus according to Figure 8, in side elevation,

Figure 10 shows a detail of Figure 8 on a larger scale and

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Figure 11 shows the metering device according to Figure 4 but with an oscillator which prevents blockage of the discharge device.

The apparatus shown in Figures 1 to 3 and 8 and 9 and designated 1 and 51 is used to produce pellets 4 of identical shape from a viscous material 2 which is stored in a storage container 5 in the apparatus 1 and fed continuously, under pressure, through a delivery line 6 equipped with a pump 7. In order to convert the flow of medium 2 into the pellets 4, the apparatus 1 is provided with a metering device 11 in which the medium 4 is divided into individual fragments 3 of equal length from which the fragments 3 are ejected into a catching container 10 over a given distance S. The metering device 11 is disposed in a housing 8.

In the apparatus 1 according to Figure 1 the metering device 11 is formed by a shutoff valve 12 which can be operated electrically, hydraulically, pneumatically, piezoelectrically or mechanically by means of a drive member 13. The shutoff valve 12 may be formed, as shown in Figures 4, 5 and 6, by a ball 14 or by a cone 15, as shown by a dotted line in Figure 4, as a movable valve member which co-operates with a spherically shaped valve seat 16, or by a slide member 17 engaging with its conical tip 18 in the delivery line 6.

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According to Figure 6, the metering device is constructed as a fluidic member in the form of a hose section 19 connected to the delivery line 6 and surrounded by a piezo-actuated drive element 20. The medium 2 is again divided into fragments by the pressure acting on the hose section 19 from outside.

According to Figure 2, downstream of the metering device 11 is a discharge device 21 which is connected to the metering device 11 via an intermediate line 9. By means of the discharge device 11 the fragments 3 are ejected at high speed. To achieve this, a carrier medium, e.g. compressed air, is supplied to the discharge device 21 through a line 22 and acts on the fragments 3 which are to be ejected.

According to Figure 11, downstream of the metering device 11 is a discharge device 21 which is connected to the metering device 11 via an intermediate line 9. The oscillator 40 is connected directly to the discharge device 21. The generator 41 sets the oscillator 40 vibrating. This oscillating system helps prevent blockage of the nozzle.

Downstream of the discharge device 21, according to Figure 7, is a tunnel 31 in which the expelled fragments 3 can be cooled down by means of a gas atmosphere 35. In addition, the tunnel 31 may be fitted with spray nozzles 36 by means of which an active substance 37 can be sprayed, for example, in order to coat the fragments 3 and/or pellets 4.



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As shown in Figure 3, the storage container 5 may optionally be fitted with heating elements 32 to increase the viscosity of the medium 2 stored therein. For the same purpose, the metering device 11 may be kept at a constant operating temperature by means of heating elements 33. There are also cooling elements 34 in the tunnel 31 according to Figure 3, for cooling the pellets 4.

The pellets 4 are produced by means of the apparatus 1 as follows: the medium 2 which is continuously fed into the metering device 11 by means of the pump 7 at a constant pressure is divided into individual fragments 3 by the shutoff valve 12 which opens and closes cyclically; by varying the opening and closing times of the shutoff valve 12 the length of the fragments 3 can be adjusted individually.

Closing the shutoff valve 12 causes the valve member to accelerate the fragments 3 additionally and eject them faster, directly or by means of the discharge device 21. In their flight over the distance S adjacent to this discharge device 21 the individual fragments 3 are deformed as a result of surface tension, as shown in Figure 7, to form spherical pellets 4 which are virtually identical in size and reproducibility.

In the apparatus 51 for producing pellets shown in Figures 8 to 10, the metering device 61 is formed by a valve tappet 62 provided with a conically shaped tip 63 which co-operates with a suitably shaped chamber 57. The valve

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tappet 62 is movably inserted in a housing 52 which contains a storage container 54 for the medium which is to be processed and guide channels 55 and 55' through which the medium can be fed via an annular space 66 into a collecting chamber 65 associated with the valve tappet 62.

In the embodiment shown, the collecting chamber 65 is formed by three radially directed channels 67 which are connected to the annular space 66 and open into the chamber 57 which is bounded by a counter-surface 59 associated with the valve tappet 62.

The channels 67 and also the chamber 57 are incorporated in a cover screwed onto the housing 52. Also, an outlet port 58 through which the fragments can be expelled individually is provided in the cover on an extension of the chamber 57.

The valve tappet 62 is driven by a cyclically operated piston 64 which is displaceably mounted in a bushing 53 inserted in the housing 52. Its passage through the housing 52 is sealed off by a membrane 68 through which the valve tappet 62 passes. Also, in order that the medium can be processed at any selected operating temperature, a plurality of heating cartridges 69 or 70 are inserted in the housing 52 in the region of the storage container 54 and valve tappet 62.

The medium located in the storage container 54 is acted upon by pressurised gas via a connection 60, so that the medium is forced through the channels 55, 55', the annular

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space 66 and the channels 67 forming the collecting chamber 65 into the chamber 57. If the valve tappet 62 is driven cyclically by means of the piston 64, at each stroke a fragment corresponding to the capacity of the chamber 57 is forced out of the discharge port 58 and is then automatically shaped into a pellet.

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Patent Claims

1. Process for producing pellets (4) from a viscous medium (2), characterised in that the medium (2) to be processed is fed continuously, under preferably constant pressure, to a metering device (11, 61) which is operated under cyclical control, by means of which the medium (2) is divided into individual fragments (3) of a pre-selected length and these fragments are expelled or ejected over a pre-selected distance (S).
2. Process according to claim 1, characterised in that the temperature of the medium (2) to be processed is adjusted, before it is fed to the metering device (11, 61), by heating or cooling a storage container (5, 54) and/or a delivery line (6) and/or the metering device (11, 61).
3. Process according to claim 1 or 2, characterised in that the temperature of the expelled fragments (3) is controlled during the ejection over the entire area or in one or more parts of the distance (S), preferably by means of the ambient temperature.
4. Process according to one or more of claims 1 to 3, characterised in that the individual fragments (3) are

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expelled at an accelerated speed, e.g. with the aid of a discharge device (21).

5. Process according to one or more of claims 1 to 4, characterised in that the fragments (3) are provided with a coating during the ejection.
6. Process according to one of more of claims 1 to 5, characterised in that the fragments (3) are expelled in a ballistic trajectory.
7. Apparatus (1, 61) for producing pellets (4) from a viscous medium (2), characterised by a metering device (11, 61) operated under cyclical control, to which the medium (2) to be processed is supplied continuously under pressure and by means of which the medium (2) is divided into individual fragments (3) of a pre-selected length which are preferably expelled at an accelerated rate over a pre-selected travel distance (S).
8. Apparatus according to claim 7, characterised in that the metering device (11) is constructed as a shutoff valve (12) which can be operated cyclically by magnetic, hydraulic, pneumatic, piezoelectric or mechanical means.

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9. Apparatus according to claim 8, characterised in that the valve member of the shutoff valve (12) may be constructed as a sphere (14) or cone (15) co-operating with a spherically shaped valve surface (16) or as a slide member (17) which can be pushed into the delivery line (6) and is provided with a tip (18) which is triangular in cross section.
10. Apparatus according to claim 7, characterised in that the metering device (11) may be constructed as a fluidic valve constructed in the form of a section of hose (19) attached to the delivery line (6) and provided with a piezo-actuated drive element.
11. Apparatus according to claim 7, characterised in that the metering device (61) is formed as a valve tappet (62) displaceably inserted in a housing (52) and operated cyclically by magnetic, hydraulic, pneumatic, piezoelectric or mechanical means, which has a spherically or conically shaped tip (63) and co-operates with a collecting chamber (65) to which the medium (2) may be fed from a storage container (54) preferably integrated in the housing (52).
12. Apparatus according to claim 11, characterised in that associated with the valve tappet (62) is a conically shaped chamber (57) adapted to fit the tip (63)

•





Fig. 1

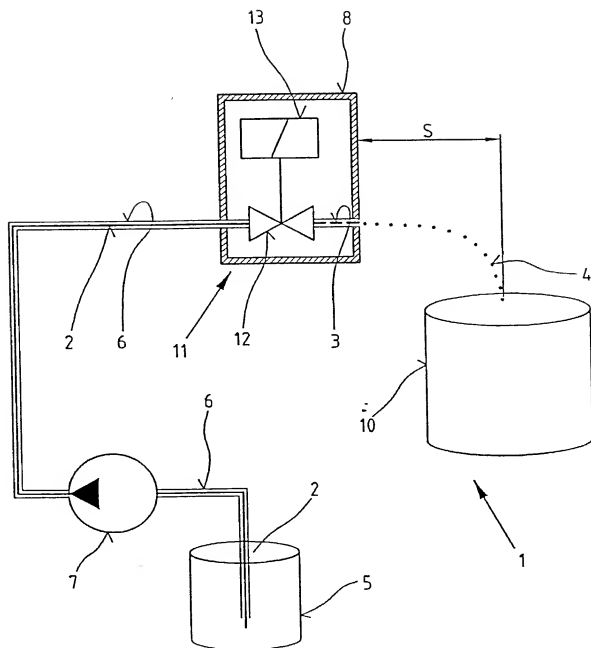


Fig. 2

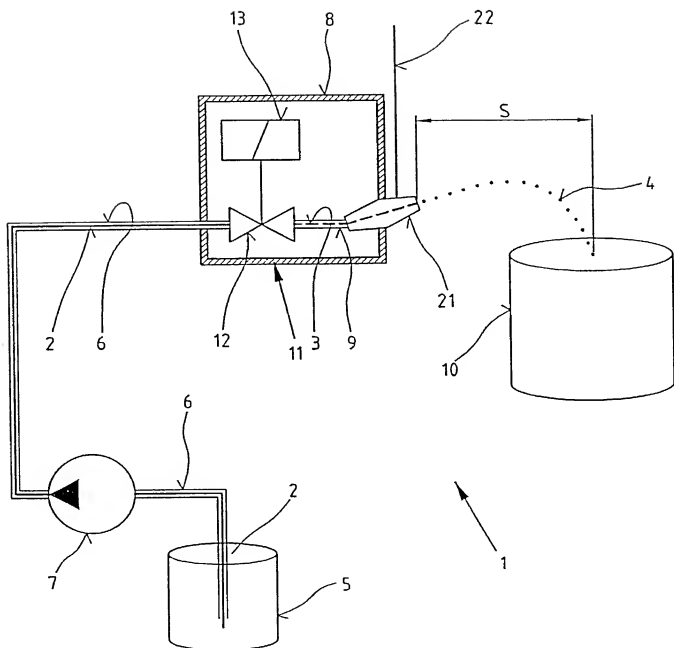


Fig. 3

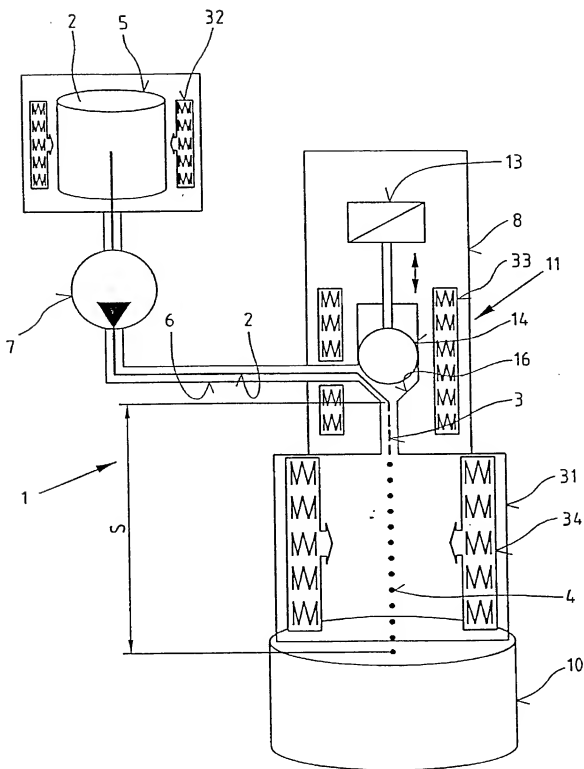


Fig. 4

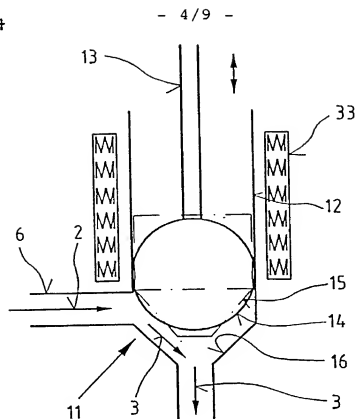


Fig. 5

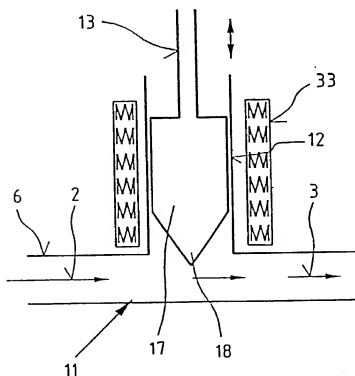


Fig. 6

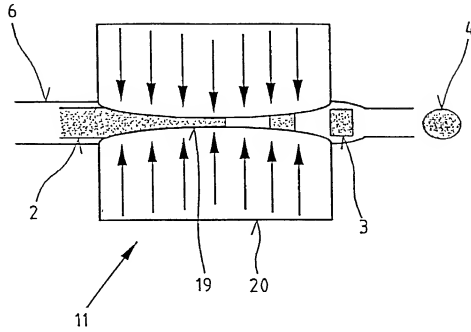


Fig. 7

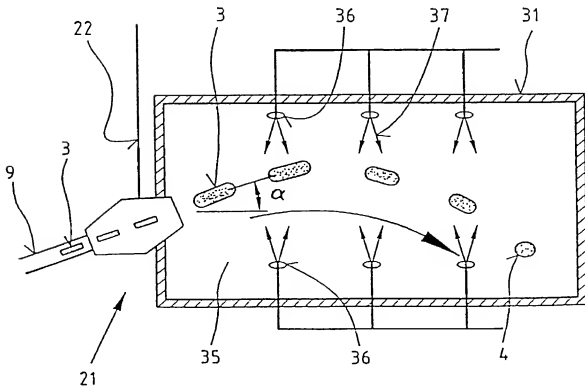




Fig. 9

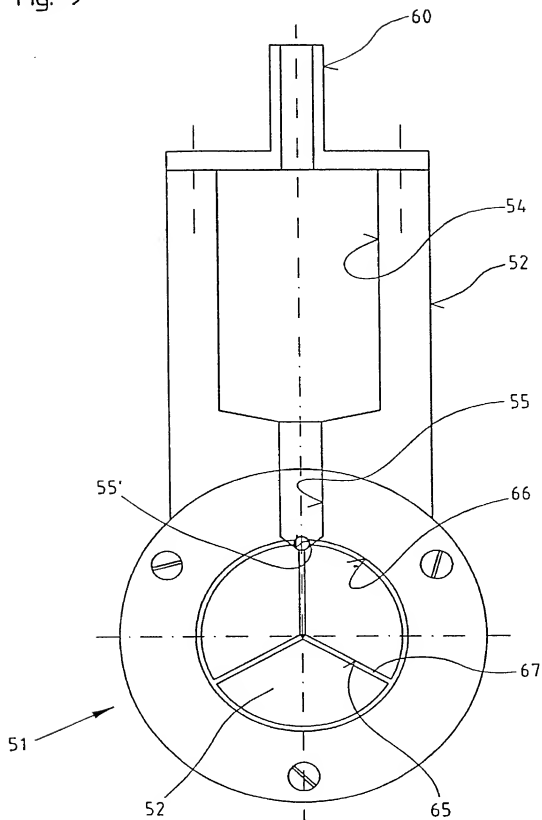


Fig. 10

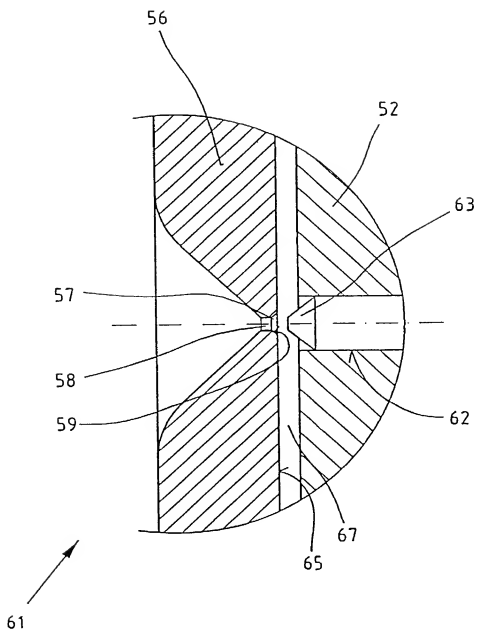
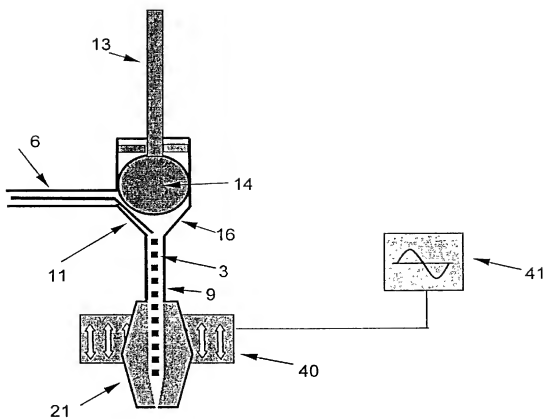




Fig. 11



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**DECLARATION FOR UTILITY OR  
 DESIGN  
 PATENT APPLICATION  
 (37 CFR 1.63)**

☐ Declaration Submitted with Initial Filing  
 OR ☒ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number	5/1263 PCT
First Named Inventor	Wolfgang Joerg et al.
<b>COMPLETE IF KNOWN</b>	
Application Number	10 / 018,641
Filing Date	December 19, 2001
Art Unit	To be assigned
Examiner Name	To be assigned

As the below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Method and Device for Producing Pellets

(Title of the Invention)

the specification of which

☐ is attached hereto

OR  
☒ was filed on (MM/DD/YYYY) 06/23/2000 as United States Application Number or PCT International

Application Number PCT/EP00/05801 and was amended on (MM/DD/YYYY) 12/19/2001 (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed



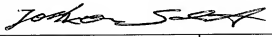
Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
199 29 526.3 PCT/EP00/05801	Germany	06/28/1999	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		06/23/2000	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto

[Page 1 of 2]

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.							
NAME OF SOLE OR FIRST INVENTOR :		<input type="checkbox"/> A petition has been filed for this unsigned inventor					
Given Name (first and middle (if any))		Wolfgang		Family Name or Surname		Joerg	
Inventor's Signature						Date 04/02/2002	
Residence: City		Laupertshausen		State DEU		Country Germany	
		Citizenship		DE			
Mailing Address Dahlienweg 6							
City		Laupertshausen		State		ZIP 88437	
		Country		Germany			
NAME OF SECOND INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor					
Given Name (first and middle (if any))		Johann		Family Name or Surname		Schwartz	
Inventor's Signature						Date 05/09/02	
Residence: City		Warthausen		State DEU		Country Germany	
		Citizenship		DE			
Mailing Address Am Hang 2							
City		Warthausen		State		ZIP 88447	
		Country		Germany			
<input checked="" type="checkbox"/> Additional inventors are being named on the <u>1</u> supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.							

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## DECLARATION

ADDITIONAL INVENTOR(S)  
Supplemental Sheet  
Page 1 of 1

Name of Additional Joint Inventor, if any:

☐ A petition has been filed for this unsigned inventor

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Family Name or Surname

300 Andreas

Ege

Inventor's  
Signature

Andrew Ege

Date 04/02/2002

Residence: City Mittelbiberach

State

DEU

Country

Germany

Citizenship

DE

Biberacher-Strasse 15

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Mailing Address

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State

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Country

Germany

400 Name of Additional Joint Inventor, if any:

☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))

Family Name or Surname

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Recker

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Signature

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Country

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Citizenship

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500 Name of Additional Joint Inventor, if any:

☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))

Family Name or Surname

Gerhard

Steiner

Inventor's  
Signature

Gerhard Steiner

Date 04/02/2002

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# **POWER OF ATTORNEY OR AUTHORIZATION OF AGENT**

Application Number	10/018,641
Filing Date	December 19, 2001
First Named Inventor	Wolfgang Joerg et al.
Title	Method and Device for Producing Pellets
Group Art Unit	To be assigned
Examiner Name	To be assigned
Attorney Docket Number	5/1263 PCT

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☐ Assignee of record of the entire interest. See 37 CFR 3.71.

Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

## **SIGNATURE of Applicant or Assignee of Record**

Name	Johann Schwartz
Signature	<i>Johann Schwartz</i>
Date	05/09/02

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Examiner Name	To be assigned
Attorney Docket Number	5/1263 PCT

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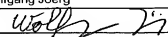
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Name	Wolfgang Joerg
Signature	
Date	04/01/2002

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Title	Method and Device for Producing Pellets
Group Art Unit	To be assigned
Examiner Name	To be assigned
Attorney Docket Number	5/1263 PCT

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Name	Andreas Ege
Signature	<i>Andreas Ege</i>
Date	04/02/2002

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Examiner Name	To be assigned
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Name

Robert Becker

Signature

Date

04/02/2002

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Name	Gerhard Steiner
Signature	<i>Gerhard Steiner</i>
Date	04/02/2002

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